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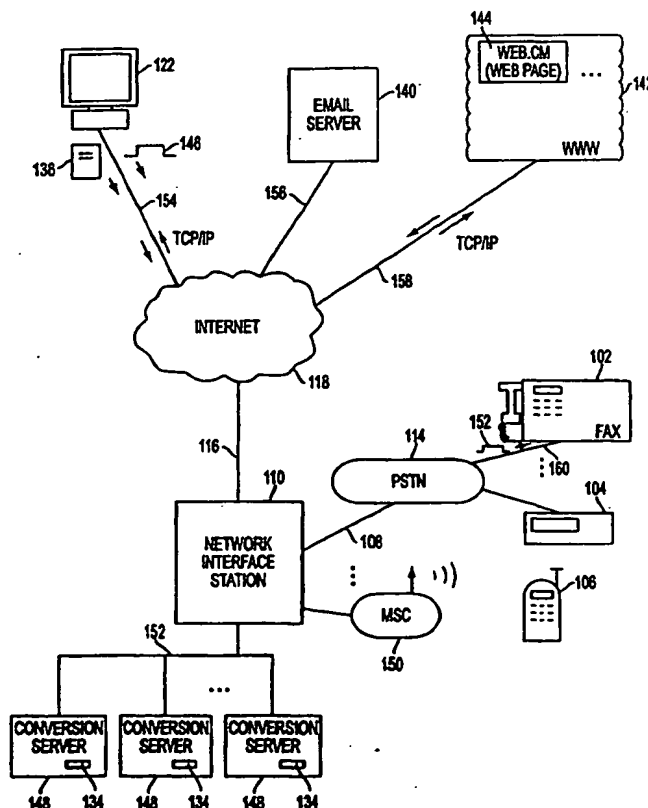
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(54) Title: **SYSTEM AND METHOD FOR TRANSLATING MESSAGES BETWEEN DIFFERENT ELECTRONIC FORMS**

(57) Abstract

A system and method translates an incoming electronic message (136), for instance an email document in HTML or other format, into a format suitable for transmission to a generally non-network device, such as a facsimile machine. The arriving message is routed to and processed by a network interface station, which captures the incoming message, checks a subscriber's desired output format and destination, and converts the message to that form, invoking native applications for conversion if necessary. Automatic call back can be programmed if the transmission fails, or the system can be set to store the message for the recipient to dial in. Users not having a personal computer and/or an Internet service account can thereby still receive electronic messages such as email, Web page (144) information and others in a manner transparent to sender and receiver.



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SYSTEM AND METHOD FOR TRANSLATING MESSAGES BETWEEN DIFFERENT ELECTRONIC FORMS

Field of the Invention

5 The invention relates to the exchange of electronic information, and more particularly to translating electronic messages from email, Web page or other sources to facsimile or other formats.

Background of the Invention

10 The advent of the Internet, the World Wide Web within the Internet, and other network technology has increased the ability to read and exchange electronic information, including Web pages and email. Users commonly send and receive email over the Internet or other networks via a personal computer using the TCP/IP (transfer control protocol/Internet protocol) communications standard, which most personal computers and other devices are configured to
15 use.

 The use of PCs to exchange email or other electronic messages is convenient for parties that have personal computers and associated network access, such as Internet service provider accounts. However, many parties do not have PCs or ISP accounts.

20 It has been known to offer an attachment device with TCP/IP capability that connects to individual facsimile machines to accept email TCP/IP messages, convert them to a graphical form and print that data out over the fax machine's output printer. While this technique permits remote access to email, certain drawbacks exist. For example, a great variety of facsimile machines
25 exist and making an attachment peripheral that works reliably with the variety of existing and newly developed machines can be time consuming and expensive. Additionally, by using an attachment device with each facsimile machine, the per unit cost for a functional messaging station is high. There is a continued need for better, more flexible and more economical message translation facility.
30 Other drawbacks exists.

Summary of the Invention

The invention overcoming these and other problems in the art relates to a system and method for translating messages between different electronic forms
5 which freely exchanges documents between electronic devices, whether designed for network protocol or not.

An object of the invention is to provide a system and method that translates email messages received from a sender using the standard TCP/IP protocol to facsimile format.

10 Another object of the invention is to provide a system and method that translates Web page information retrieved from an Internet site using the standard TCP/IP protocol to facsimile format.

Another object of the invention is to provide a system and method that deploys a central translation facility for exchanging messages which is available
15 to a plurality of machines, relieving users of the cost and maintenance of add-on hardware devices.

Another object of the invention is to provide a system and method that deploys a central translation facility for exchanging messages which can be maintained and upgraded at that central facility, without having to separately
20 adjust individual receiving stations.

Another object of the invention is to provide a widely accessible message port to download email documents and Web page information.

According to one embodiment of the invention, an email message is retrieved by a network translation station using the TCP/IP protocol, instead of
25 direct delivery to another TCP/IP terminal. The network translation station verifies, opens and analyzes the original format such as attachments in Microsoft WordTM, HTML, or other formats. The network translation station converts the message to a format which can be transmitted as a facsimile message to the intended recipient's facsimile machine. The process of creating
30 the interchangeable message is transparent to both the sender and receiver of the message.

Brief Description of the Drawings

Fig. 1 is an illustration of an architecture for message exchange according to the invention.

Fig. 2 is an illustration of a network translation station according to the invention.

Fig. 3 is a flowchart illustrating message processing according to the invention.

Fig. 4 is an illustration of handshaking between a network interface station and a facsimile machine according to the invention.

Fig. 5 is an illustration of a handshaking between a network interface station and a facsimile machine according to another aspect of the invention.

Detailed Description of Preferred Embodiments

The invention will be described with respect to a network over which an electronic message 136 is transmitted to a recipient's facsimile station 102, as illustrated in Fig. 1. The content of electronic message 136 may be in ASCII, hyper text markup language (HTML), or other format. It will be understood that electronic message may include or point to another document as an attachment. The attachment may be in any of a variety of formats such as Microsoft Word™, HTML, Excel™, PowerPoint™ and others. In the illustrated embodiment, it is assumed that the electronic message 136 is transmitted using the TCP/IP communication standard known in the art. Electronic message 136 is sent by a transmitting party from transmitting station 122, which may be a personal computer running any common operating system.

Transmitting station 122 transmits electronic message 136 to a recipient address 146, which is formatted in standard TCP/IP based protocol. Transmitting station 122 is connected via communications link 154 to the Internet 118, which link may be a dial-up modem connection, ISDN, or other wired or wireless connection.

The electronic message 136 is routed from Internet 118 over communications link 116 (which may be any conventional connection) to an email server 140 associated with the recipient's address 146. Email server 140

processing, storage and related hardware to accept and store electronic message 136, and may for instance be deployed by an Internet service provider (ISP).

As illustrated in Fig. 2, the network interface station 110 includes a controller 124 for executing programmed instructions, a memory 126 such as electronic random access memory, and storage 128 such as a hard drive. Controller 124, memory 126 and storage 128 are connected over electronic bus 130, as will be appreciated by persons skilled in the art. Network interface station 110 may comprise a personal computer or workstation running the Unix, Linux, Windows NTTM or other available operating systems, for example.

Network interface station 110 also includes an input/output unit 132 attached to electronic bus 130, and interfacing to communications link 112 from the PSTN 114 and to a communications link 116 to the Internet 118. Communications link 116 may be a wired or wireless TCP/IP based communications link. connected to a local central office 106. The facsimile station 102 of the intended recipient is connected by communications link 160, which may be the local loop of the telephone network, to the public switched telephone network 114, to which the network interface station 110 is also connected over communications link 108, which can be any suitable wired or wireless connection to the public telephone network.

At periodical intervals or upon request from subscribers, network interface station 110 logs into an retrieves the electronic message 136 intended for the recipient. Network interface station 110 then prepares the incoming message for transmission in standard facsimile CCIT Group III or other form. Particularly, network interface station 110 contains an account registration table 138, in which the account information of recipients subscribing to services according to the invention is stored, including subscriber ID and other associated fields.

When electronic message 136 arrives at network interface station 110 over communications link 116, controller 124 causes a lookup against account registration table 138 to validate the recipient's account. If the recipient is a valid subscriber and the message was sent to the appropriate recipient address

140, network interface station 110 examines the received electronic message 136 for file type, file extension and other message information. If the address, subscriber or other information is not valid, electronic message 136 may be returned or other action taken.

5 Network interface station 110 assesses the document type of electronic message 136 including any attachments, after which controller 124 may cause one or more of native applications 134 to be invoked to open and read the message. For this purpose, network interface station 110 has connected to it over communications link 152 a set of conversion servers 148, each of which is
10 a personal computer or workstation configured to run one or more native applications 134 corresponding to and reading a given document type. Communications link 152 may for instance be a local area network such as an EthernetTM or other connection type.

 If for example the received electronic message 136 is presented in a
15 standard word processing format, such as Microsoft WordTM format, an instance of that client native application is initiated on one of the conversion servers 148 connected to network interface station 110 to open the electronic message 136 and any attachments. Conversely, it will be understood that if the electronic message 136 is in a simple character format such as ASCII or is not compound
20 in form, one or more native applications 134 may not need to be invoked. The opening of electronic message and attachments may in one regard be facilitated through use of object linking and embedding (OLETM) technology or COM or other technology compatible with the operating system.

 Once the electronic message 136 is opened under the native application
25 134, network interface station 110 prepares the message for delivery. Account registration table 138 is examined to determine from the recipient's account information what form of delivery or storage the recipient desires. In the illustrated embodiment, the recipient configures his or her account for facsimile (e.g., Group III) transmission. Controller 124 thus causes native application 134
30 to save the electronic message 136 in facsimile-compliant format, to transmit the electronic message 136 in that form to the recipient's facsimile station 102.

Controller 124 may do so by invoking a communications utility amongst native applications 134, for instance. A temporary or permanent copy of electronic message 136 so translated may be stored in storage 128, and the recipient's account information in account registration table 138 may be updated with time and date receipt, sender ID and other information related to the messaging event.

The account information may include fields indicating whether the recipient subscriber wishes to have the incoming message stored in storage 128 of network interface station 110 for dial-up at the recipient's convenience to activate by command, or to have network interface station 110 immediately attempt to dial the recipient's stored facsimile number to transmit the message. If the latter option is selected, the network interface station 110 may revert to storing the electronic message 136 in storage 128 when the attempted delivery transmission fails.

Assuming that the recipient's account registration indicates immediate delivery (fax-on-receipt), after completion of the translation of the electronic document 136 the network interface station 110 initiates an outbound facsimile transmission to the recipient's facsimile station 102 by transmitting a messaging command 162. Network interface station 110 retrieves the telephone number registered in account registration table 138 for the intended recipient, and initiates a call via communications link 108, the PSTN 114, and communications link 160 to facsimile station 102. Input/output unit 132 transmits a set of handshaking signals via those links to facsimile station 102, to prepare that output device for the incoming message. As illustrated in Fig. 4, that handshaking may in one embodiment comprise a DTMF tone code burst as a messaging command 162 to which an account number, facsimile command and checksum are sent in response by facsimile station 102.

Alternatively, as illustrated in Fig. 5 the transmitted to the facsimile station 102, a CED faxtone (call station identification, 2100Hz tone for 1.8-2.5 seconds) and DIS (digital identification signal) V.21 HDLC frame may be transmitted as a messaging command 162 to facsimile station 102, to which an NSS (non-standard facility setup, with command) V.21 HDLC frame is sent in

response by facsimile station 102, along with a DCN (disconnect) V.21 HDLC frame, as understood by persons skilled in the art. The network interface station 110 and facsimile station 102 thus establish a communications connection. Other initiation protocols are possible.

5 After the handshaking setup is complete, network interface station 110 transmits the graphical facsimile representation of electronic message 136 including any attachments to facsimile station 102. After end of transmission acknowledgment, network interface station 110 disconnects the transmission call. Network interface station 110 may then record transmission information
10 in the account information fields of account registration table 138, and close any open native applications 134 on conversion servers 148. If the first attempted transmission to facsimile station 102 does not succeed, network interface station 110 may automatically retry the transmission for a predetermined number of times, or store the electronic message 136 for later retrieval by the subscriber.

15 In an alternative implementation, after receipt and conversion of the electronic message 136, network interface station 110 may place the converted message directly in storage 128, to wait for the recipient to activate his or her facsimile station 102 and dial in to network interface station 110, manually. It is advantageous that facsimile station 102 and the telephone number used to
20 access network interface station 110 be within a local telephone call of each other, to reduce communication costs.

 Fig. 3 illustrates a flowchart of message processing according to the invention. In step 202, processing begins. In step 204, the remote device, illustratively facsimile station 102, initiates messaging commands. In step 206,
25 the subscriber's account is checked against the account registration table. If the address and recipient account are validated, then the remote messaging command is read to begin email or Web page retrieval. If the recipient's account is not valid, the message is returned or other action taken in step 210, and processing ends.

30 If the message is valid, in step 212 the network processing station decodes the format, file extension and other information relate to the nature and

type of the electronic message including any attachments. In step 214, the network interface station 110 transmits the electronic message 136 to a conversion server 148 to invoke whichever native application 134 is necessary to read the message. In step 216, the electronic message 136 is converted by the
5 conversion server 148 to a type compatible with the subscriber's delivery requirements, in this case facsimile transmission (non-TCP/IP). In step 218 the converted message is transmitted back to network interface station 110. In step 220, the network interface station 110 transmits the converted electronic message to facsimile station 102, either on the same call as that initiated by
10 facsimile station 102 or by re-connecting after an intervening hangup. In step 222, processing ends.

The foregoing description of the system and method of the invention is illustrative, and variations in configuration and implementation will occur to persons skilled in the art. For instance, while the receiving device has been
15 described as a facsimile machine, other communication devices, such as alphanumeric pagers, palmtop devices, teletype, analog or digital cellular telephones, or other wired or wireless devices could be used. Fig. 1 illustrates network interface station 110 communicating with, besides facsimile station 102, a wired alphanumeric device 104, as well as a cellular telephone 106 over a
20 wireless mobile switching center 150.

Furthermore, while the original electronic message has been described as an Internet email message sent according to the TCP/IP communications protocol, other transmitting devices, formats and communications protocols could be used.

25 For particular example, instead of retrieving electronic message 136 from an email server 140, the network interface station 110 may retrieve information in HTML or other format from the World Wide Web 142 over communications link 158, which may be any conventional link, as illustrated in Fig. 1. Network interface station 110 does so in this case by accessing a Web
30 page 144 identified by a Universal Resource Locator (URL) stored in a user's account registration table 138, either periodically or by some triggering event

such as a PointcastTM broadcast or other notification. The HTML or other document so retrieved is then analyzed by network interface station 110, converted by conversion server 148 and conveyed to the subscriber according to their specified delivery scheme.

- 5 Yet further, while the invention has been described with respect to a network transmission device transmitting to a non-networked output-only device, in another embodiment the recipient apparatus may be capable of transmitting input of its own or other messages to network interface station 110. The scope of the invention is intended to be limited only by the following
- 10 claims.

Claims

1. A method of translating an electronic message for transmission to a recipient, comprising the steps of:
 - a) receiving an electronic message in a first format from a transmitting station
5 at a network interface station;
 - b) associating the electronic message with a recipient located at a receiving station having a second format; and
 - c) translating, in the network interface station, the electronic message to the second format for transmitting to the recipient.
- 10 2. The method of claim 1, wherein step (a) comprises the step of storing information related to the electronic message in the network interface station.
3. The method of claim 1, wherein step (b) comprises the step of performing a lookup of the recipient against an account registration table.
4. The method of claim 1, further comprising the step of (d) transmitting
15 the translated electronic message to the receiving station.
5. The method of claim 1, wherein the electronic message comprises an electronic email message.
6. The method of claim 1, wherein the receiving station comprises a facsimile machine.
- 20 7. The method of claim 1, wherein the receiving station comprises a wireless communication device.
8. The method of claim 7, wherein the wireless communication device comprises a cellular telephone.
9. The method of claim 1, wherein the electronic messages comprises
25 information from a World Wide Web page.
10. The method of claim 1, wherein step (c) comprises the step (e) of invoking at least one native application to translate the electronic message.
11. A network interface system for translating an electronic message for transmission to a recipient, comprising:
30 an input interface for receiving an electronic message in a first format from a transmitting station at a network interface station;

a controller, connected to the input interface, the controller associating the electronic message with a recipient located at a receiving station having a second format, the controller translating the electronic message to the second format for transmitting to the recipient; and

5 an output interface, connected to the controller, for transmitting the translated electronic message to the recipient.

12. The system of claim 11, further comprising a storage unit, the storage unit storing information related to the electronic message in the network interface station.

10 13. The system of claim 11, wherein the controller performs a lookup of the recipient against an account registration table.

14. The system of claim 11, wherein the controller causes the translated electronic message to be transmitted to the receiving station via the output port.

15 15. The system of claim 11, wherein the electronic message comprises an electronic email message.

16. The system of claim 11, wherein the receiving station comprises a facsimile machine.

17. The system of claim 11, wherein the receiving station comprises a wireless communication device

20 18. The system of claim 17, wherein the wireless communication device comprises a cellular telephone.

19. The system of claim 11, wherein the electronic message comprises information from a World Wide Web page.

25 20. The system of claim 11, wherein the controller invokes at least one native application to translate the electronic message.

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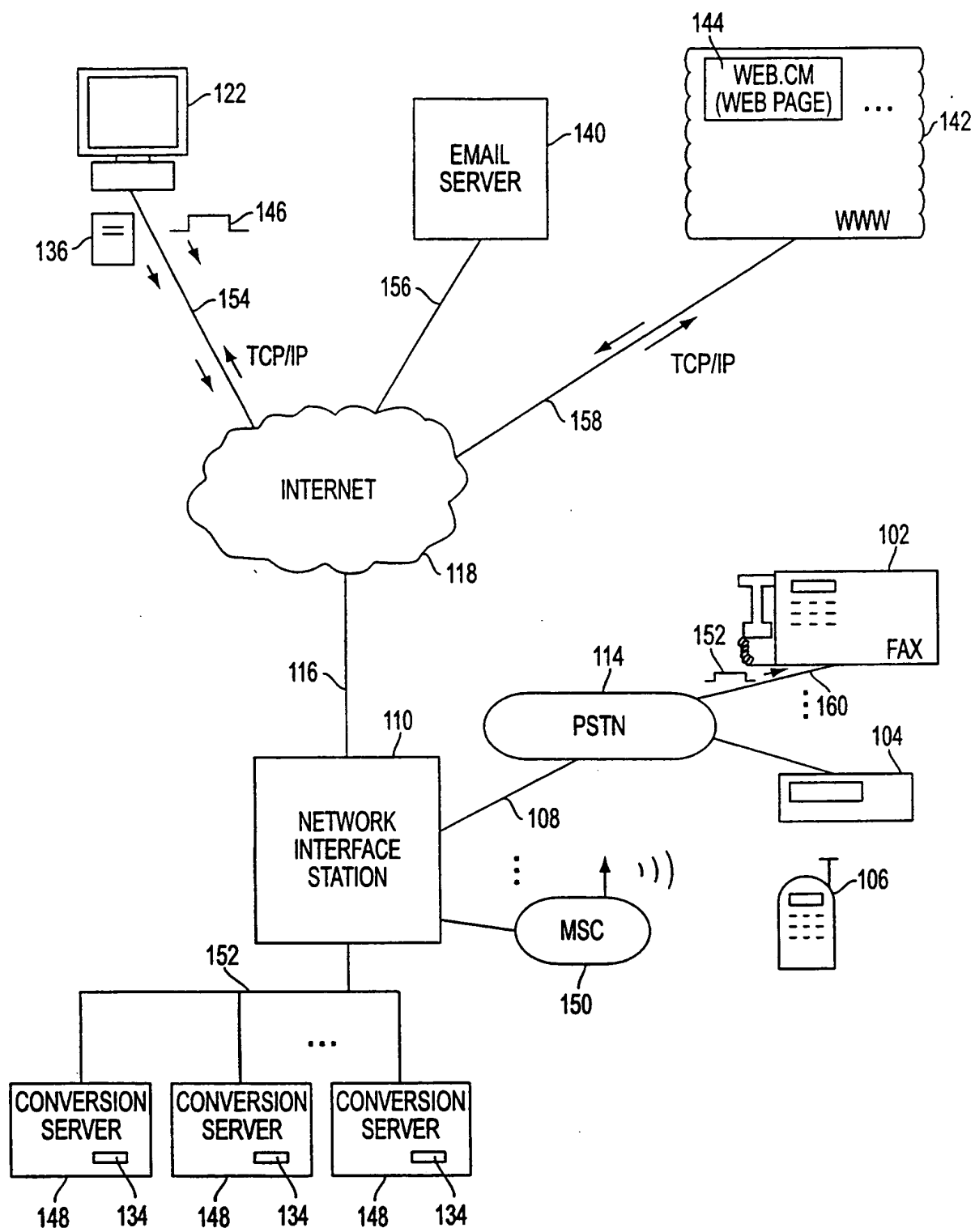


FIG. 1

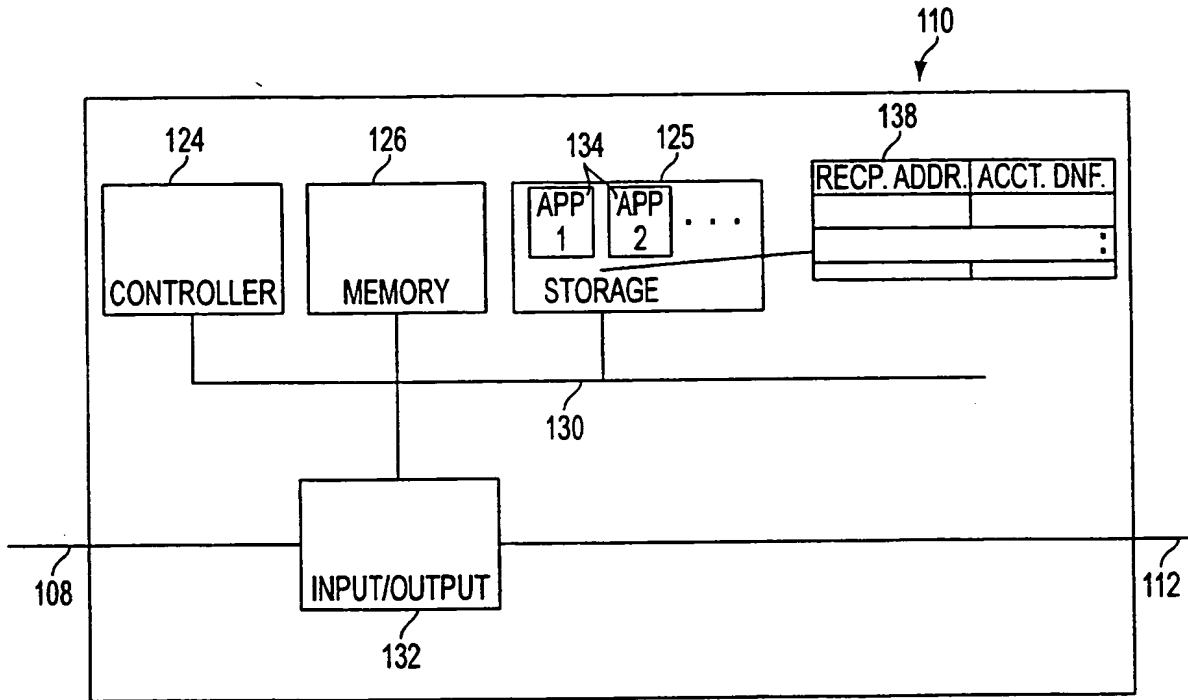


FIG. 2

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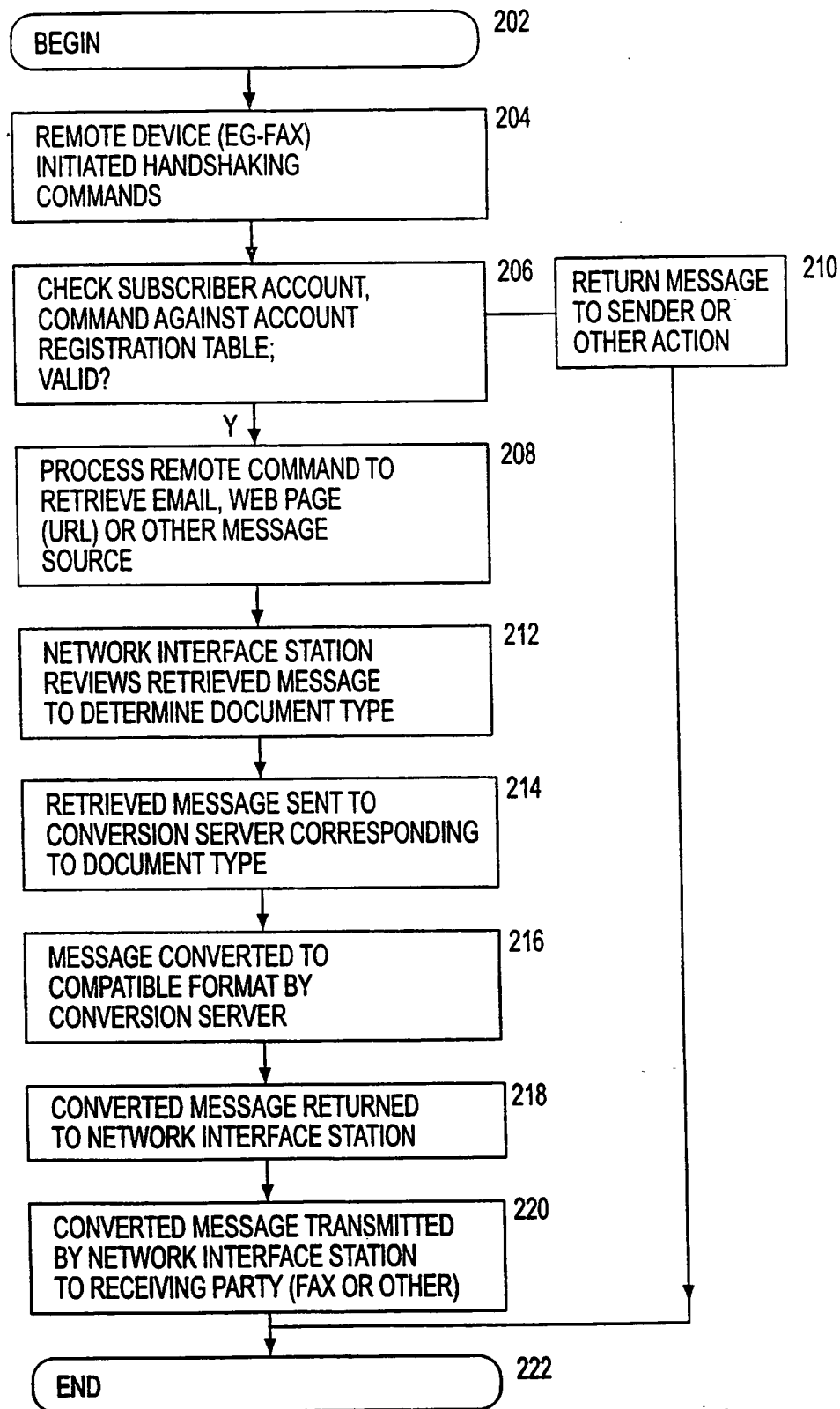


FIG. 3

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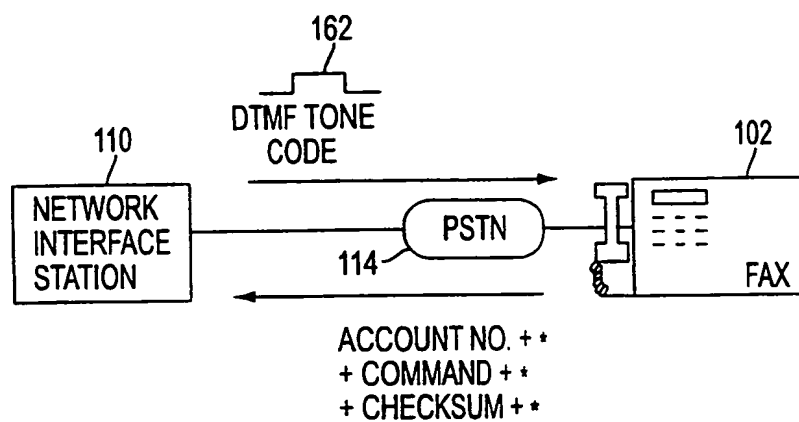


FIG. 4

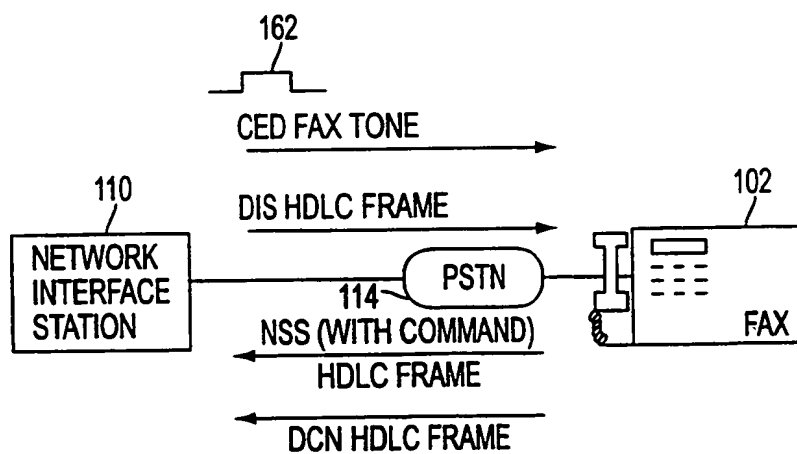


FIG. 5

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US99/11111

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) : H04N 1/00
US CL : 358/402

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 358/402, 468, 400, 403, 405, 434, 435, 436, 438, 439; 379, 100.01, 100.06, 100.08, 100.09, 100.12, 102.03

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X -- Y	JP 05-233488 A (NAGURA) 10 September 1993, see entire document.	1, 4, 5, 6, 10, 11, 14, 15, 16, 20 ----- 2, 3, 7, 8, 12, 13, 17, 18
Y	US 5,701,183 A (BELLEMARE et al.) 23 December 1997, col. 4, lines 34-40	2, 12
Y	JP 10-164122 A (KOBAYASHY) 19 June 1998, entire constitution	3, 13
Y	US 5,822,692 A (KRISHAN et al.) 13 October 1998, see col. 5.	7, 17

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5,787,365 A (RIVERO et al.) 28 July 1998, col. 2, lines 35-40	8,18
X	US 5,848,415 A (GUCK) 08 December 1998, col. 5, line 57 -65; col. 6, lines 25-69 and col. 8, lines 5-15.	9,19
A,P	US 5,881,233 A (TOYODA et al.) 09 March 1999; see figures 1 and 3	1-20

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